

WHAT IS CLAIMED IS:

1. A method for generating a thumbnail image, comprising:
discarding data of a portion of lines of an original image of an original document; and

combining data not discarded to generate the thumbnail image corresponding to the original image.
2. The method of claim 1, further comprising:
identifying the portion of lines to be discarded based on a y_position value and a y_increment value;

selecting pixels in lines not discarded that are within a neighborhood from a current x_position value and an x_size value; and

combining values of selected pixels to generate a value of a current pixel of the thumbnail image.
3. The method of claim 2, further comprising:
including one or more pixels in a first neighborhood that are within a boundary corresponding to the current x_position value and a position corresponding to a sum of the current x_position value and the x_size value;

generating a next current x_position value for a next pixel of the thumbnail image by:
 - 1) adding the x_increment value to the current x_position value corresponding to the current pixel of the thumbnail image, or
 - 2) adding the y_increment value to a current y_position value corresponding to the current pixel of the thumbnail image and setting the next current x_position value to an x_start value if a sum of the x_increment value and the current x_position value exceeds a line_width value, or when an x_count value of reduced size pixels

exceeds an `x_count_limit` value, the `x_count` value being a pixel number in a current line of the reduced size image; and

including pixels in a next neighborhood that are within a next boundary corresponding to the next current `x_position` value for the next pixel of the thumbnail image and the next current `x_position` value corresponding to a sum of the current `x_position` value and the `x_size` value.

4. The method of claim 3, further comprising:
using repeatedly a last pixel when positions corresponding to the sum of a value of the current `x_position` value and the `x_size` value exceed a position of a last pixel in a current line of the original image.

5. The method of claim 3, further comprising:
setting the boundary to include pixels of the original image that has a position that is at most half a distance between adjacent pixels from the current `x_position` value, and to include pixels of the original image that has a position that is less than half the distance between adjacent pixels from a position of the current `x_position` value plus an `x_size` value.

6. The method of claim 2, further comprising:
setting a number of selected pixels to be a power of two;
summing into a sum the selected pixels; and
binary shifting the sum by an exponent of the power of two to generate the current pixel of the thumbnail image.

7. A method for generating a reduced size image, comprising:
discarding all data spanned by a portion of one or more first dimensions of a plurality of dimensions that span an original image of an original document; and
combining data not discarded to generate a reduced size image corresponding to the original image.

8. The method of claim 7, further comprising:

identifying the portion of the first dimensions based on one or more first position values and one or more first increment values, one first position value and one first increment value corresponding to each of the first dimensions;

identifying the data not discarded based on the first position values, the first increment values, second position values and second increment values, each pair of the second position and increment values corresponding to one of second dimensions which are the plurality of dimensions other than the first dimensions;

selecting data points of the data not discarded that are within a neighborhood from a current position value corresponding to the first and second position values; and

combining selected data points to generate a current data point of the reduced size image.

9. The method of claim 8, further comprising:

including one or more data points in a first neighborhood that are within a boundary corresponding to the current position value and a position value corresponding to a sum of the current position values and corresponding size values, one size value corresponding to each of the second dimensions;

generating next current position values for a next data point of the reduced size image by:

1) adding the second increment values to the current position values corresponding to the current data point of the reduced size image in the second dimensions, or

2) adding the first increment values to the current position values corresponding to the current data point of the reduced size image in the first dimensions and setting the next current position values in the second dimensions to

start values corresponding to the second dimensions if a sum of the second increment values and the current position values exceeds width values corresponding to any of the second dimensions, or when a count value in one of the second dimensions of reduced size pixels exceeds a corresponding count_limit value, the count value being a next data point position in a current line of the reduced size image; and

including data points in a next neighborhood that are within a next boundary corresponding to the next current position and a position value corresponding to a sum of the current position values and the corresponding size values.

10. The method of claim 9, further comprising:
replicating last data points in any of the second dimensions when respective position values corresponding to the sums of the current position values and the corresponding size values exceed position values of last data points in respective dimensions in the original image.

11. The method of claim 9, further comprising:
setting the boundary to include data points of the original image that has a position value that is at most half a distance between adjacent data points from the current position value in any of the second dimensions, and to include data points of the original image that has a position value that is less than half the distance between adjacent data points from a position value set by any one of the current position values plus a corresponding size value in any of the second dimensions.

12. The method of claim 8, further comprising:
setting a number of selected data points to be a power of two;
summing into a sum the selected data points; and
binary shifting the sum by an exponent of the power of two to generate the current data point of the reduced size image.

13. An apparatus, comprising:

an interpolator;

a position controller coupled to the interpolator;

one or more position values couple to the position controller, the position controller discarding all data in an original image of an original document spanned by a portion of first dimensions of a plurality of dimensions that span the original document by processing the position values to skip over discarded data, and the interpolator combining data not discarded to generate a reduced size image of the original image.

14. The apparatus of claim 13, further comprising:

first increment values; and

second increment values; the position values including first position values and second position values, the position controller:

identifying the portion of the first dimensions based on the first position values and the first increment values;

identifying the data not discarded based on the first position values, the first increment values, the second position values and the second increment values, each pair of the first position and increment values corresponding to one of first dimensions, each pair of the second position and increment values corresponding to one of second dimensions which are the plurality of dimensions other than the first dimensions;

selecting data points of the data not discarded that are within a neighborhood from a current position value corresponding to the first and second position values, and

the interpolator combining selected data points to generate a current data point of the reduced size image.

15. The apparatus of claim 14, further comprising:

size values, one size value corresponding to each of the second dimensions, the position controller:

including one or more data points in a first neighborhood that are within a boundary corresponding to the current position value and a position value corresponding to a sum of the current position values and corresponding size values,

generating next current position values for a next data point of the reduced size image by:

1) adding the second increment values to the current position values corresponding to the current data point of the reduced size image in the second dimensions, or

2) adding the first increment values to the current position values corresponding to the current data point of the reduced size image in the first dimensions and setting the next current position values in the second dimensions to start values corresponding to the second dimensions if a sum of the second increment values and the current position values exceeds width values corresponding to any of the second dimensions, or when a count value in one of the second dimensions of reduced size pixels exceeds a corresponding count_limit value, the count value being a next data point position in a current line of the reduced size image; and

including data points in a next neighborhood that are within a next boundary corresponding to the next current position and a position value corresponding to a sum of the current position values and the corresponding size values.

16. The apparatus of claim 15, the position controller using repeatedly respective last data points in any of the second dimensions by keeping the current position value at the last data points when position values corresponding to the sums

of the current position values and the corresponding size values exceed position values of the last data points in respective dimensions in the original image.

17. The apparatus of claim 16, the position controller setting the boundary to include data points of the original image that has a position value that is at most half a distance between adjacent data points from the current position value in any of the second dimensions, and to include data points of the original image that has a position value that is less than half the distance between adjacent data points from a position value set by any one of the current position values plus a corresponding size value in any of the second dimensions.

18. The apparatus of claim 15, the interpolator:
obtaining a power of two of selected data points;
summing into a sum the selected data points; and
binary shifting the sum by an exponent of the power of two to generate the current data point of the reduced size image.

19. An apparatus, comprising:
position controlling means for identifying data points of an original image of an original document to be used to generate a reduced size image; and
interpolation means for generating output data points of the reduced size image based on the data points identified by the position controlling means.

20. A xerographic marking device incorporating the apparatus of claim 13.

21. A marking device incorporating the apparatus of claim 13.

22. A digital photocopier incorporating the apparatus of claim 13.

23. A software program that generates a thumbnail image, the software program performing actions comprising:

discarding data of a portion of lines of an original image of an original document; and

combining data not discarded to generate the thumbnail image corresponding to the original image.

24. The software program of claim 23, performing further actions comprising:

identifying the portion of lines to be discarded based on a y_position value and a y_increment value;

selecting pixels in lines not discarded that are within a neighborhood from a current x_position value and an x_size value; and

combining values of selected pixels to generate a value of a current pixel of the thumbnail image.

25. The software program of claim 24, performing further actions comprising:

including one or more pixels in a first neighborhood that are within a boundary corresponding to the current x_position value and a position corresponding to a sum of the current x_position value and the x_size value;

generating a next current x_position value for a next pixel of the thumbnail image by:

1) adding the x_increment value to the current x_position value corresponding to the current pixel of the thumbnail image, or

2) adding the y_increment value to a current y_position value corresponding to the current pixel of the thumbnail image and setting the next current x_position value to an x_start value if a sum of the x_increment value and the current x_position value exceeds a line_width value, or when an x_count value of reduced size pixels exceeds an x_count_limit value, the x_count value being a pixel number in a current line of the reduced size image; and

including pixels in a next neighborhood that are within a next boundary corresponding to the next current x_position value for the next pixel of the thumbnail image and the next current x_position value corresponding to a sum of the current x_position value and the x_size value.

26. A computer-readable medium, comprising the software program of claim 23.